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IDENTIFIERS	*National Science Teachers Association

ABSTRACT

This is part of a series of four modules intended to present guidelines to representatives from a community for evaluation of their school's secondary science programs. This module encourages the representatives to review, ponder, and evaluate the science curriculum in their schools for their children and students and then: (1) decide what it is that they want or expect the science program to accomplish, and (2) assess how well they think their science goals and desired results are being achieved. Each assessment contains two parts: desirability and achievement. (SA)

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ED176974

Guidelines for Self-Assessment of Secondary-School Science Programs

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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1. Our School's Science Curriculum

National Science Teachers Association

SE 028 881

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This module is one part of a set of guidelines for the self-assessment of science programs, prepared by the National Science Teachers Association. The modules in the set are:

1. **Our School's Science Curriculum**
2. **Our School's Science Teachers**
3. **Science Student/Teacher Interactions in Our School**
4. **Science Facilities and Teaching Conditions in Our School**

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I. Our School's Science Curriculum

For purposes of this document and its goal of encouraging self-assessment, the school science curriculum is considered to be comprised of everything that students study and everything that they do when they "take science" as part of their educational program. A course in chemistry, the study of various minicourses, participation in a science club or a student science contest, a science project, a field trip to a sewage disposal plant, or a medical research center, or a plastics manufacturing plant — all of these kinds of activities, and others as well, help make up the total science curriculum.

In this section, you are encouraged to review, ponder, and evaluate the science curriculum in **your** school for **your** children and students — and then (1) decide what it is that you want or expect the science program to accomplish and (2) assess how well you think **your** science goals and desired results are being achieved. You should, of course, try to think in terms of the overall, the large picture, and develop judgments not swayed or biased unduly by infrequent exceptions.

It is strongly recommended that the ratings for this section, except Part B, be developed through consensus of a committee representing not only the school science faculty but also including broad representation of the science students, parents of students, scientists and engineers from your community, employers of students upon leaving school, and/or other groups as appropriate or desired in **your** community. Section B should be done by a representative student committee and a science department committee. A separate matrix should be completed by both groups.

A twofold assessment is called for — the first in terms of the DESIRABILITY of the various aspects of preparation, professional activities, and attitudes for **your teaching situation** and **your school**. The second is an assessment of the degree of ACHIEVEMENT of the item. The rating scales to be used are as follows:

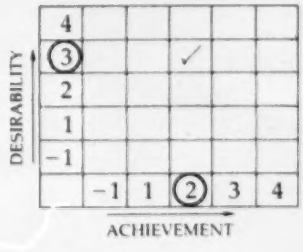
DESIRABILITY for Our School

4 — **very desirable;** of utmost value
3 — **desirable;** of significant value
2 — **moderately** desirable; of medium value
1 — **unimportant;** of insignificant value in our school science program
—1 — **undesirable;** of negative value in our school science program

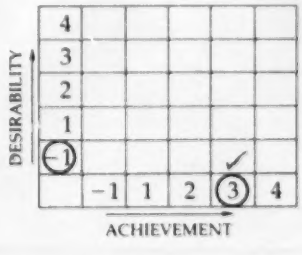
ACHIEVEMENT in Our School

4 — **excellent;** outstanding, extremely high level
3 — **very good;** above average
2 — **moderate** but significant; about average
1 — **low** (small) achievement or practice; below average
—1 — avoided or counteracted in our school

At the right of each item is a small matrix in which the rating is recorded. The vertical axis represents DESIRABILITY. Circle the rating that you wish to give to desirability. The horizontal axis represents ACHIEVEMENT. Circle the rating that you wish to give to achievement. Then, for the score on this item, place a check mark in the box where these ratings intersect. Thus, an item that was deemed highly desirable but only moderately achieved would be recorded as follows:



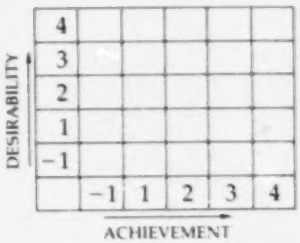
An item considered undesirable, but found to be present to a high degree would be recorded as follows:



A. Why Science in Our School?

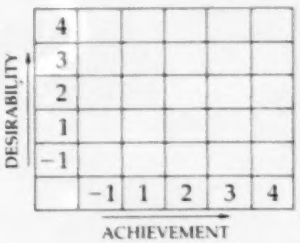
The first, most obvious question to ask about the school science program is why is it there; what do we want the study of science to contribute to the education of our children; what would be lost if science disappeared from the total educational program? Consider and discuss all of the following items, plus others you may wish to add, and then evaluate each as per instructions.

1. Science is required by state law.



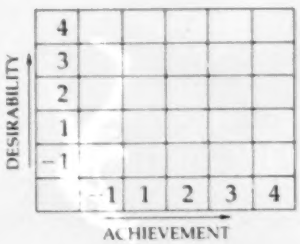
Comments _____

2. Science is a tradition in our school.



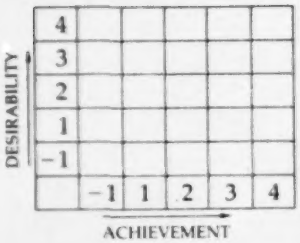
Comments _____

3. The major purpose of science study is to lay the foundation for students to take more science.



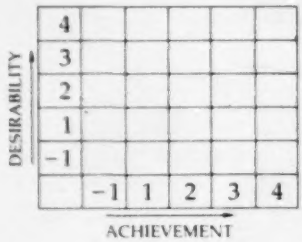
Comments _____

4. Science helps students prepare for entering college after leaving high school.



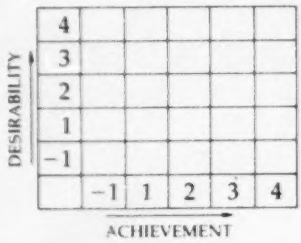
Comments _____

5. Science leads to understanding of the interrelationships and interdependence among man, plants, animals, and the air, water, soil, and other materials of planet Earth.



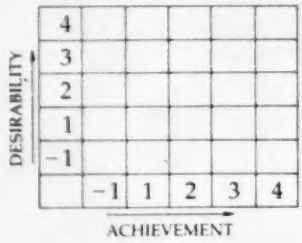
Comments _____

6. Science reveals a variety of career opportunities, regardless of sex or ethnic background, in science and other science-related occupations.



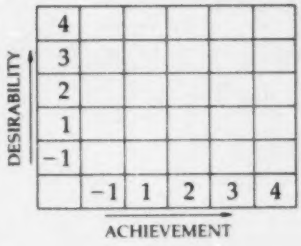
Comments _____

7. Science helps students use knowledge of science in decision-making relative to problems of man and society; e.g., food supply; human sexuality, reproduction, and population; environmental quandaries; energy supply and demand; health facilities and services; city and regional planning; other.



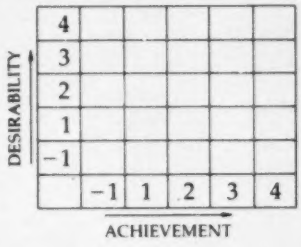
Comments _____

8. Science helps students develop an understanding of scientists and how they go about their work.



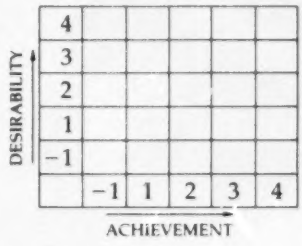
Comments _____

9. Science helps students become more effective in their personal and social living; e.g., in safety habits as in driving automobiles, using electrical appliances, controlling fire hazards; consumer practices as in heating homes, selecting building materials, caring for home and grounds; hobby practices as in photography, collecting insects, working with rocks and minerals.



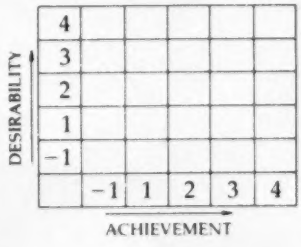
Comments _____

10. Science helps students develop a variety of skills through doing laboratory and project work, making models and displays, caring for plants and animals.



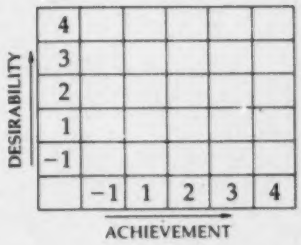
Comments _____

11. Science helps students understand how major developments in science have affected man and society; e.g., Mendel's studies and today's breeding of plants and animals; conservation of mass/energy and today's energy problems; Maxwell's equations and today's communication by radio and TV; Darwin's studies and man's thinking about his origin and development; Watson and Crick and the possibility of genetic manipulation.



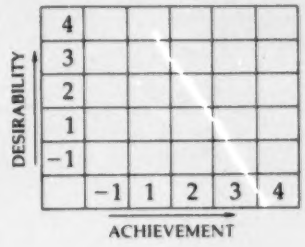
Comments _____

12. Science includes discussions of man's abuses of science and technology.



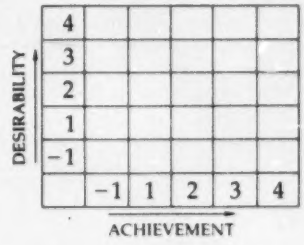
Comments _____

13. Science helps students prepare for immediate employment with saleable skills after leaving high school.



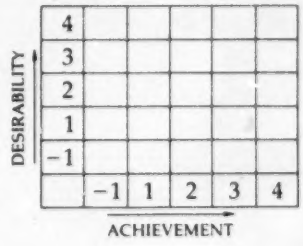
Comments _____

14. Science provides opportunities for students to have experiences similar to those of practicing scientists; e.g., to identify problems, use the library, design methods for the study of problems, carry through projects, and write reports.



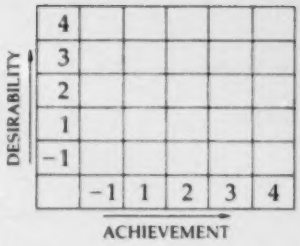
Comments _____

15. Science helps students develop a realistic basis for value systems and form enlightened opinions relative to the roles of science and technology and of scientists and engineers in matters of concern to society; e.g., health care, poverty, resources, war and peace, environmental quality, government, urban development.



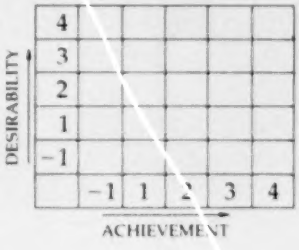
Comments _____

16. Science helps students improve their communication skills through activities such as listening, reading, writing, graphing and diagramming, making slides and films, watching and reporting on television programs.



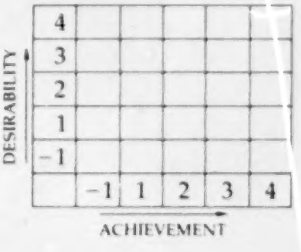
Comments _____

17. Science helps students prepare for entering technical training for careers as in nursing, gardening, automobile mechanics, etc.



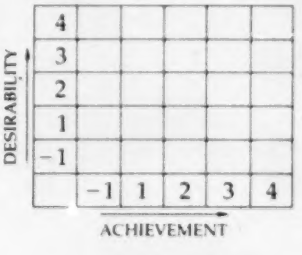
Comments _____

18. Science helps students develop and practice using attitudes and habits essential to critical thinking; e.g., suspending judgment, testing the accuracy of data, evaluating and using sources of data and information.



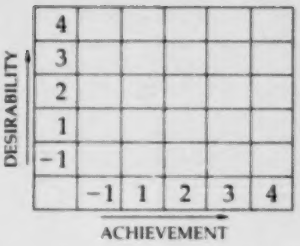
Comments _____

19. Science helps students develop sensitivity, curiosity, fascination, and appreciation in relation to the objects and events of the natural world about them.



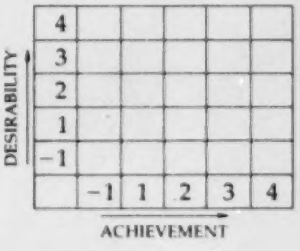
Comments _____

20. Other: _____



Comments _____

21. Other: _____

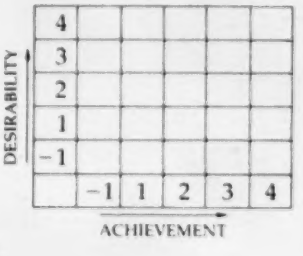


Comments _____

B. Student and Teacher Perceptions of the Science Program

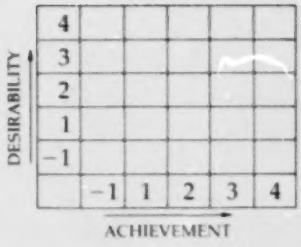
In order to achieve our goals and purposes (as set forth in Part A), what is and what should be the offering of courses and activities made available to the students in our school? What are the strengths and weaknesses of our present program? Consider all of the following items, plus others you may wish to add. Note: A separate evaluation should be made by a representative student committee and also one by the science department.

1. It is possible for a student in our school to take a different science course at each grade level.



Comments _____

2. Our science program offers a specific sequence of courses which students are required or may elect to take, depending on the student's year in school; e.g., life science 7, physical science 8, earth/space science 9 biology 10, etc.



Comments _____

3. Each science course builds upon the outcomes of previous science courses the students have taken.

Comments _____

4. Our science program offers opportunities for students to undertake the study of short courses (mini-courses) of much less than a semester duration (possibly 1 to 4 weeks).

Comments _____

5. The science courses offered in our school include the requirement for every student to spend at least 25 percent of the class time in individual or small group laboratory investigations.

Comments _____

6. Our school science program provides opportunities for interested, qualified students to do individual or specialized work in science; e.g., self-paced study, independent study, individual projects, advanced placement, peer group tutoring, etc.

Comments _____

7. Our science program extends science study beyond the school into the nearby community or more remotely; e.g., field trips, visits to industry, camping experiences, seashore and lake study, environmental action groups, etc.

Comments _____

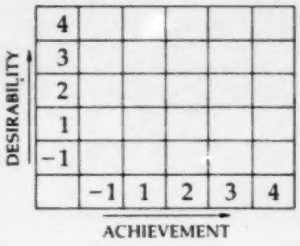
8. Individual science classes are composed of students that have a wide range of academic abilities, interests, and skills.

Comments _____

9. In our science program, there are course offerings or study opportunities for students of various ability levels, future plans, and/or varying background due to cultural or social factors or prior study of science.

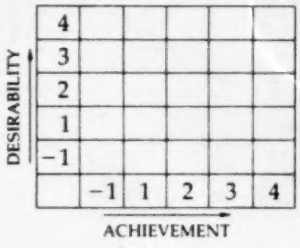
Comments _____

10. Our science program extends science study beyond the school into the real world by providing opportunities for science-related work experiences, visiting lectures, etc.



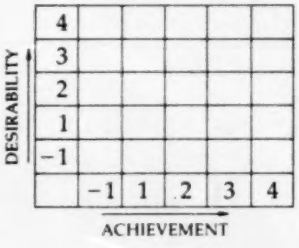
Comments _____

11. The course guide for each science class is the student's textbook.



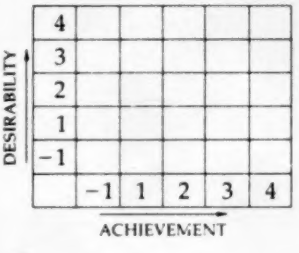
Comments _____

12. In our science classes interested students are encouraged and helped to participate in activities such as science student contests, award programs, congresses.



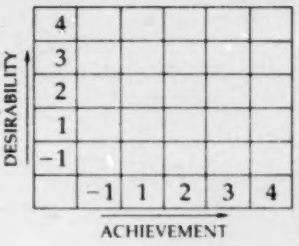
Comments _____

13. Our science teachers and counselors provide guidance to students; in selection of science courses, career opportunities, and post high school education in science and technology.



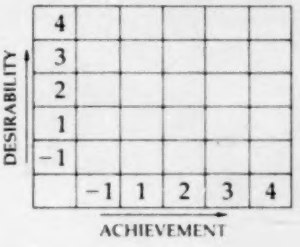
Comments _____

14. The science program includes topics of current events, future problems, issues, and needs confronting society.



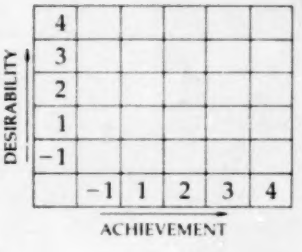
Comments _____

15. The science courses tend to be abstract and theoretical rather than applied or practical.



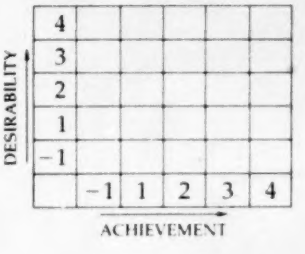
Comments _____

16. Other: _____



Comments _____

17. Other: _____

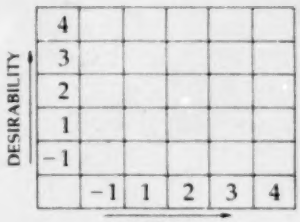


Comments _____

C. How Does Our Science Program Come to Be?

Whatever you have or want as your science program, someone or some group must consider selection criteria and decide what is to be. What are the sources and influences that bear on the decision of a science curriculum? Who are the decision makers? How are changes and innovations proposed, considered, and implemented after being accepted? Consider the following statements, plus others you may wish to add. Instructions for using the evaluation matrix are the same as those for Part A.

1. The science program in our school undergoes major change or modification every five years.

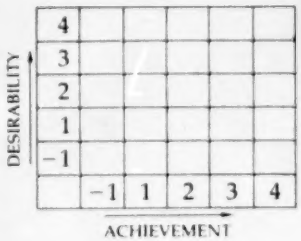


Comments _____

2. The science program development includes consideration of personal needs, interests, desires, and goals of young people and adults; e.g., health needs, the need to earn a living, the desire to know "what makes the weather?" interest in knowing "what is a gene?"

Comments _____

3. The science program development for our school includes consideration of recommendations from a K-12 curriculum committee for our school district or from the other elementary or secondary schools attended by our students.

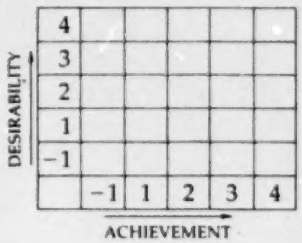


Comments _____

4. The content and nature of specific science courses are determined by the textbooks and laboratory study guides adopted for use in our school.

Comments _____

5. The science program development is influenced by information and/or recommendations from professional groups and agencies concerned with science education on a state or nationwide scale; e.g., state, regional, and national science teachers organizations; the National Assessment of Educational Progress (NAEP) findings in science; state assessment program findings in our state; the U.S. Office of Education; National Institute of Education.

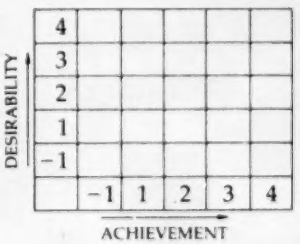


Comments _____

6. The science program development includes consideration of ideas, suggestions, and criticisms solicited from interested, concerned persons other than the staff and administration; e.g., current and former students, parents, prospective employers, and others.

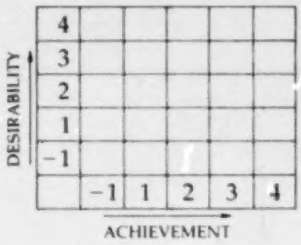
Comments _____

7 The science program development in our school is influenced by the continuous evaluation of the science curriculum (See also Part D).



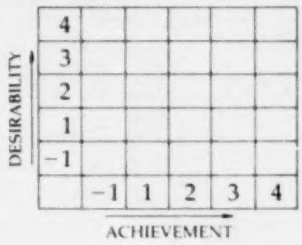
Comments _____

8. The content and nature of specific science courses are influenced by national curriculum development projects carried on during the past fifteen years or so; e.g., Intermediate Science Curriculum Study (ISCS), Biological Sciences Curriculum Study (BSCS).



Comments _____

9. The most intense pressure for science programs change or modification comes from the central administration of our school district.

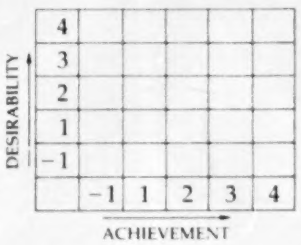


Comments _____

10. Science program development includes provision by the school district for specialists, expert leadership and/or counsel to assist staff and curriculum committees with their work; e.g., a local staff science supervisor, coordinator, or the like; external consultant(s) from college, university, or technical schools; representatives from federally funded national curriculum projects; representatives from commercial publishers of textbooks and other curriculum materials.

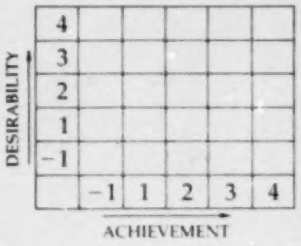
Comments _____

11. Preparatory steps are taken prior to general adoption of courses or innovations; e.g., pilot testing and evaluation; inservice programs for teachers; explanation of proposals to students, parents, and concerned citizens.



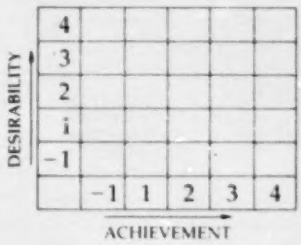
Comments _____

12. The secondary science teachers are knowledgeable about the total K-12 science program of the district and the various student activities completed at each grade.



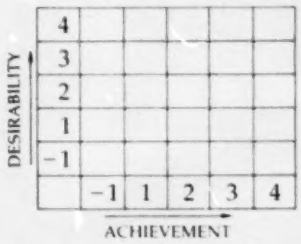
Comments _____

13. The content of specific courses (biology, chemistry, earth/space) and the sequence of course offerings are influenced by and conform to recommendations or requirements of established authority groups or agencies; e.g., local school board, state department of education, state colleges and universities, accreditation agency.



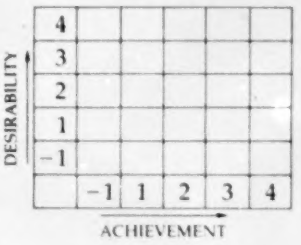
Comments _____

14. The science program (curriculum) development includes consideration of reliable knowledge about the intellectual, physical, emotional, and social growth and development of young people.



Comments _____

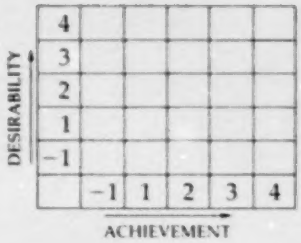
15. The Board of Education of our district is aware of the current status of the science program and future needs.



Comments _____

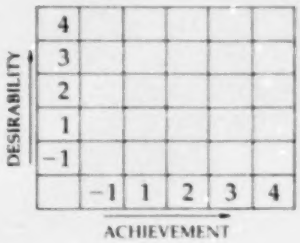
11

16. The science program development is influenced by cultural diversity among the students in our school; e.g., their ethnic, religious, racial, geographic backgrounds.



Comments _____

17. Our science program includes multidisciplinary aspects through joint planning with other curriculum areas such as English, social studies, mathematics, industrial arts.

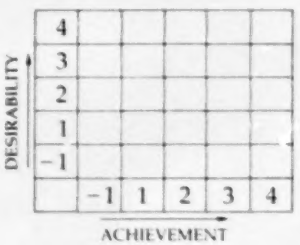


Comments _____

18. Science program development has resulted from curriculum work accomplished during school vacation time or release time.

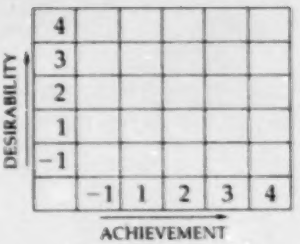
Comments _____

19. New developments in the science program are reported to the community through such means as memos to parents, news releases, television coverage of special events.



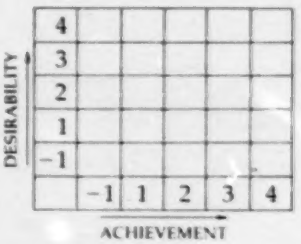
Comments _____

20. Other: _____



Comments _____

21. Other: _____



Comments _____

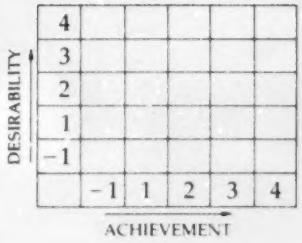
D. How is Evaluation Carried on in Our School?

Assuming that evaluation means assessing accomplishment in relation to accepted values and goals, meaningful evaluation may well be the most difficult and frustrating aspect of a school science program. Nevertheless, concerted efforts to seek dependable evaluative data must be made if arbitrary, capricious, or authoritarian judgments are to be avoided. Consider all of the following items, plus others you may wish to add. Instructions for using the matrix are the same as those for Part A.

1. District-wide tests developed by teacher committees from the district are used as end-of-course evaluations of student achievement.

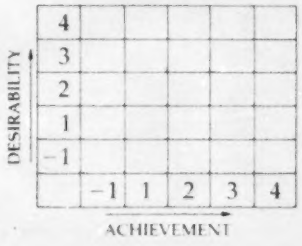
Comments _____

2. External examinations and standardized tests are used to assess individual student and group achievement in science courses for which such tests are available; e.g., Regents examinations, or ACS-NSTA tests in chemistry.



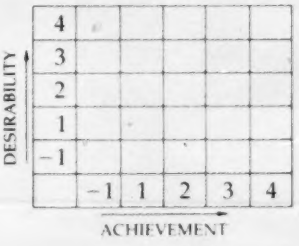
Comments _____

3. Planned, conscientious efforts are made to assess student progress and achievement in relation to objectives over and beyond knowledge and recall of information; e.g., the processes of science, interpretation of data, formulation of hypotheses, application of principles in new or untaught situations.



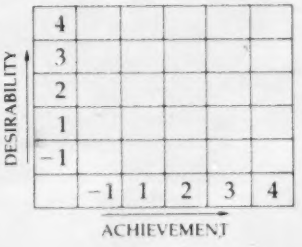
Comments _____

4. General effectiveness of our science program is judged by our students' performance on various college examinations; e.g., National Merit Scholar examinations, College Board examinations.



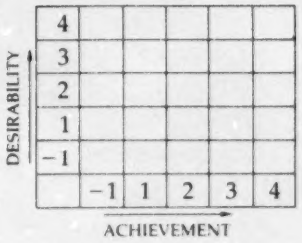
Comments _____

5. Attempts are made to assess student attitudes toward scientists, the scientific endeavor, and science technology/society relationships.



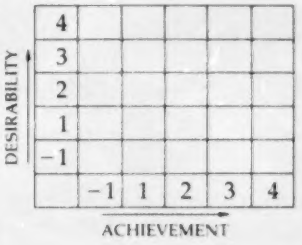
Comments _____

6. A formal evaluation of the science program has been conducted within the past seven years by an outside science consultant such as from a college, state education department, or county board of education.



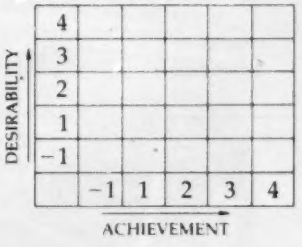
Comments _____

7. Student achievement is assessed in terms of success in meeting previously established behavioral objectives.



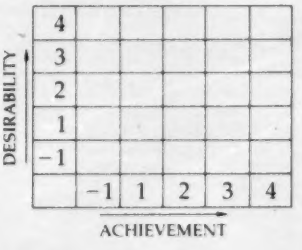
Comments _____

8. Our school's evaluation program includes teachers making anecdotal records of individual students' outstanding or special activities, accomplishments, problems, and behaviors in science.



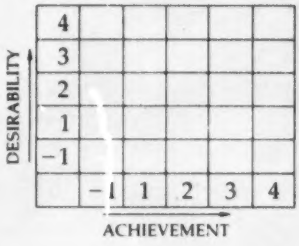
Comments _____

9. Science enrollment statistics are gathered and examined to determine whether any identifiable groups of students are not well served by the program; e.g., low achievers, minority students, females, students for whom English is a second language.



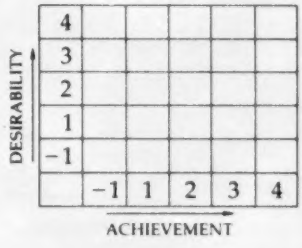
Comments _____

10. A variety of means, in addition to report cards, is employed to communicate with parents about their children's achievements; e.g., conferences, narrative or anecdotal reports.



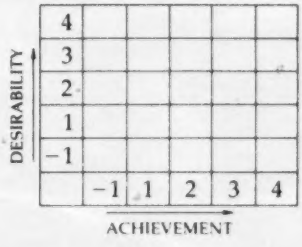
Comments _____

11. Diagnosis of student progress in science is an ongoing part of evaluation; e.g., pre- and post-testing based on the performance criteria, studying student achievement in relation to ability.



Comments _____

12. Each science course meets for the recommended amount of time for that course.

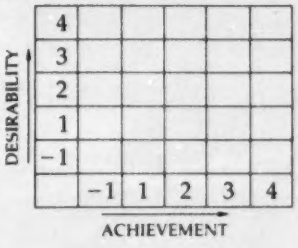


Comments _____

13. In evaluating a student's progress, care is taken to minimize the effect of such factors as cultural bias of instruments (and teachers), reading difficulties, and physical handicaps.

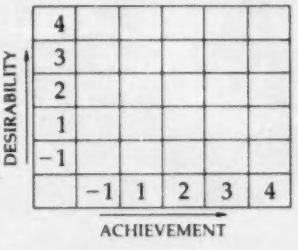
Comments _____

14. Students are involved in evaluation of curriculum, courses, and activities.



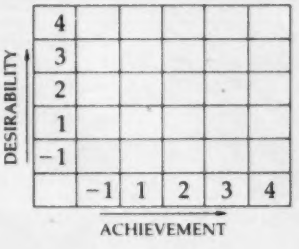
Comments _____

15. Students are involved in self-evaluation of their own progress.



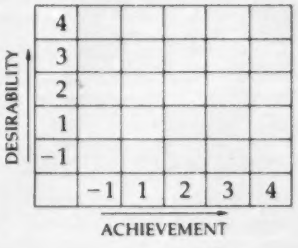
Comments _____

16. Each science course evaluates the psychomotor skills developed in the laboratory portion by means of a practicum.



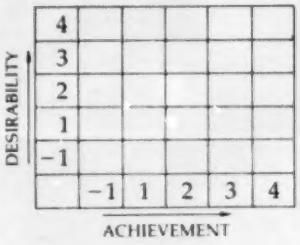
Comments _____

17. In evaluating the science program, an organized attempt is made to identify and get input from students who appear not to be well served by the program; e.g., students who have dropped courses or enrolled only in required courses, students who are failing courses, students who display negative attitudes toward their science courses.



Comments _____

18. When students begin a course they know the minimum requirements which must be met for passing that course.



Comments _____

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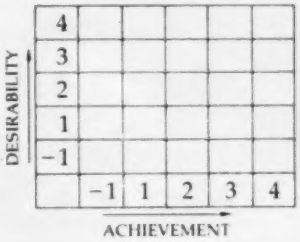
19. The science staff have visited other schools to establish standards of comparison.



Comments _____

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20. Other: _____

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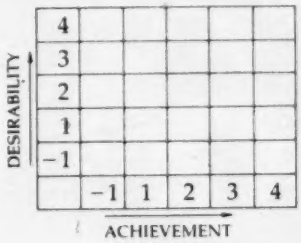

Comments _____

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21. Other: _____

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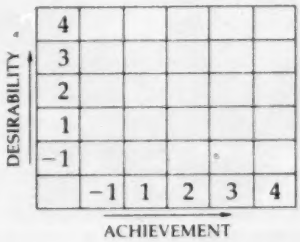

Comments _____

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15